

ELECTRIC FARMING THE NEXT GREAT ADVANCE

One Improvement in Scientific Agriculture in Which the United States Is Now Behind Germany

AMERICAN farmers are far behind farmers in Europe in the matter of replacing expensive man power and animal labor for agricultural purposes by cheap electric power, according to Frank Koester, a consulting engineer, who has for a number of years been advocating the use of electricity on the farm. In a forthcoming book on the subject he shows how electricity will help to make food cheaper and will render farm life much more attractive in the future than it has been in the past to the farmer and his employees, giving regularity of hours of labor and relief from many hardships incident to rural life. The farm will thus hold its own as a bidder for labor against the city and the factory.

While electric ploughing has been practiced for twenty years in Germany the first furrow has yet to be turned by an electric plough in this country. In other departments of agricultural electricity the United States is almost as far behind. An awakening now seems to be at hand.

There is no mechanical power which can supplant manual and animal labor on the farm or country estate as conveniently and cheaply as electricity, Mr. Koester declares. Electricity is far superior to steam or any form of internal combustion engine for supplying energy. In fact, there is no other agent which can supply all three necessities, light, heat and power from the same source.

There are thousands of steam and internal combustion engines used on American farms to-day, principally for replacing draught animals and of course a proportionate number of farmhands. They are used with machinery, such as ploughs, threshers and especially pumps. For operating small machinery such as is required in dairies, as cow milkers, cream separators, butter kneaders, &c., the internal combustion engine cannot be used as advantageously as an electric motor for the reason that the smallest internal combustion engine is about 2 horse-power, while the electric motor may be had in capacities as low as one-tenth of a horse-power, or in any required multiple sizes to suit the machinery.

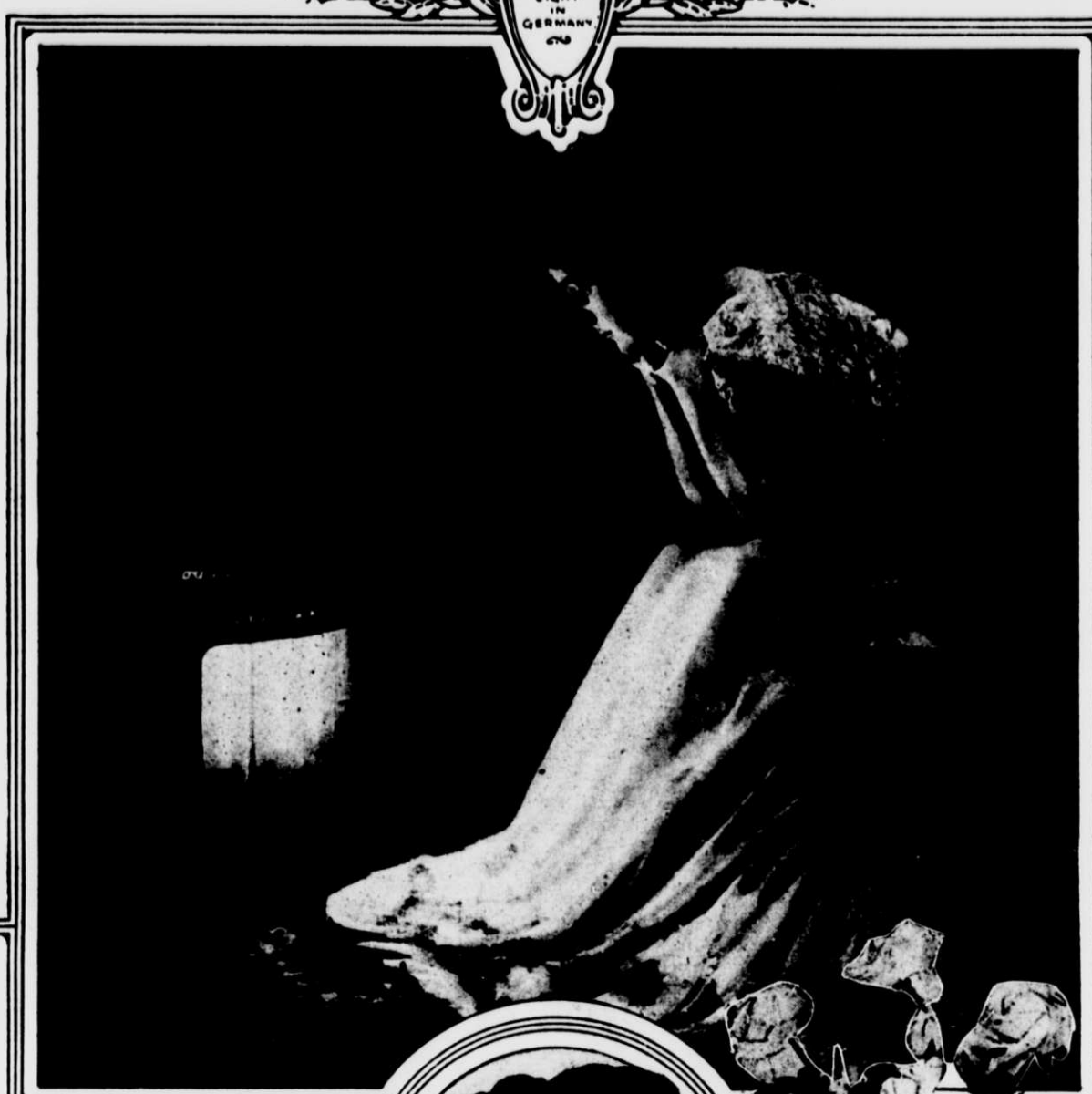
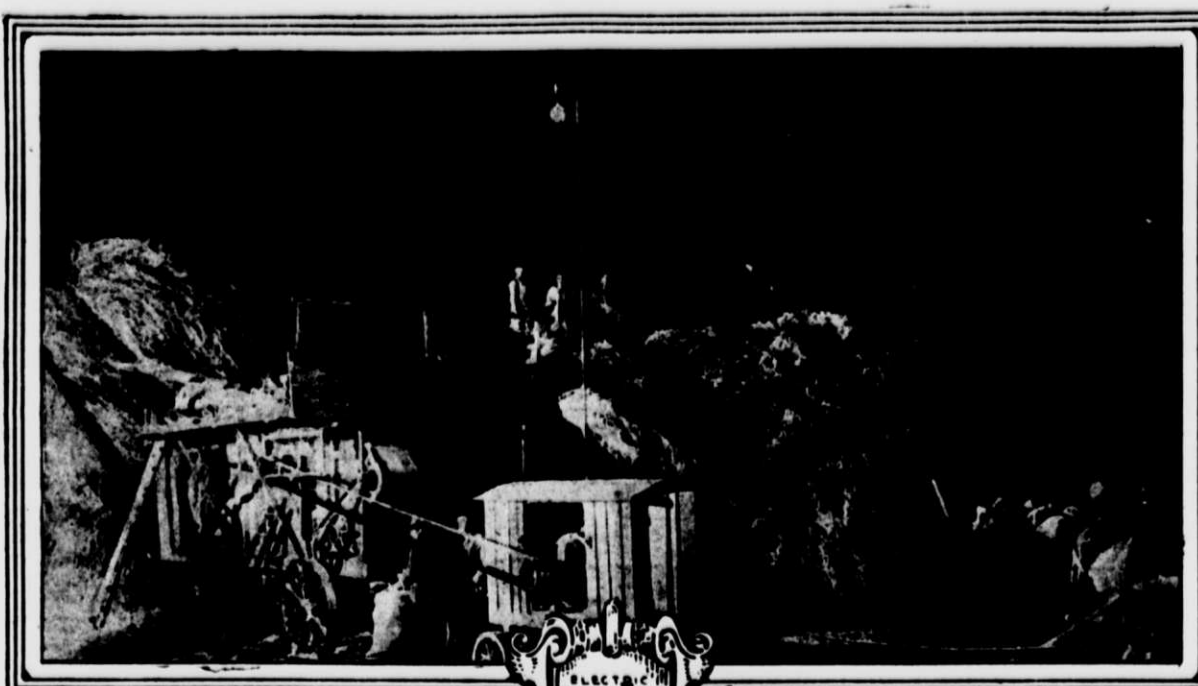
trolling may be accomplished automatically so that little attention is required. The use of a storage battery for supplying current for lighting and other purposes at night is advisable. By using storage batteries and the recently developed low voltage Tungsten lamps the cost and maintenance expenses of the plant may be considerably reduced. The main advantage of electric farming is that the farmer himself has at all times under his direct control the entire supply of electric energy being used. It may be obtained from a public service corporation at from 5 to 10 cents a kilowatt hour, or what is more desirable, the energy may be derived from the farmer's own generating plant at a cost varying from one cent a kilowatt to prices comparable with the public service charges.

A policy much adopted abroad is to install a rural central station for the purpose of supplying a number of farms, rural industries and country residences with electric current. By establishing a rural central station, with electricity generated by steam, water, gasoline, oil or gas, a great saving in the production of electric energy may be secured. To-day in Germany as many as 100 to 150 consumers are supplied from individual rural central stations.

Many of the German farmers have connected with their farms rural industries whereby they utilize their by-products, in which lies the success of many of the well-to-do farmers. One central station, for instance, has connected with it four grist mills with five motors having a total capacity of 105 horse-power, a tile works with a 40 horse-power motor, a sawmill with a 20 horse-power motor, four wheelwright shops having motors amounting to 16 horse-power and various other industries using motors of varying capacities, such as cabinet making, distilling, blacksmithing, bottling works, &c. There are also connected with the system some twenty consumers of current for lights only, having a total of 343 incandescent lamps and five arc lamps; one railway and freight station with 120 incandescent lamps, one clubhouse with seventy-two lamps and six arc lights. Further there are two towns supplied, having a total of 1,692 lamps.

A feature of decided value in agricultural electricity is that by proper selection, a few motors may be utilized to operate all the machines on the farm. This is much cheaper than to have a steam or gasoline prime mover for every machine, and this cheapness of equipment gives electricity an additional advantage over other forms of energy.

A motor placed on a low wheeled truck may for example first be connected by



Electric Luminous Radiator



PREPARING BREAKFAST BY ELECTRICITY



Electric Motor Wagon and Thresher

As such pumps are only operated at certain seasons public service corporations find it profitable to utilize for such purposes their plants, which would otherwise be idle.

Large sums are spent yearly for irrigation purposes and waterways regulation and drainage systems, but seemingly in almost all cases, without due consideration of the utilization of the energy of the water for generating electric current which might advantageously be used for farming or rural industries. Good examples on a large scale of such combination systems are to be found in Switzerland and particu-

larly in Germany, where full advantage is taken of natural resources, which are properly husbanded for the benefit of the public in general. Electric ploughing has been carried on in Germany for years and great strides have been made particularly in the last few years. Of the several systems adopted, the one and two motor systems are the most extensively used. Both methods attain the same result, that is, the plough is pulled across the field by a cable wound on a drum.

Electric ploughing has great advantages over a gasoline or steam engine ploughing system. In the latter case a

great amount of coal and water must be brought to the field, consuming the services of numerous teams and drivers.

Electric ploughing can be carried on in practically every kind of weather, even in weather so cold as to freeze the steam-operated ploughs overnight, and the electric plough can operate in soft or loamy soil, where horses cannot work, and on hilly ground.

Experience shows that the cost of electric ploughing is less than horse or steam ploughing. In its practical application it is, further, not confined to farms of large acreage, but can be carried on to good advantage on farms

Would Mean Cheaper Labor and Greater Profit, Besides Making Life on the Farm More Attractive

of small size, while a number of farmers may own a single electric plough in common, the one plough sufficing for all their work. In some cases the plough may belong to a single farmer, who rents it out.

Although it is well known that American agricultural machinery in its wide applications is in most respects far superior to that of foreign makes, yet the field of electric ploughing is principally to-day found in Germany. It would seem that if American manufacturers took up the manufacture of electric farming apparatus it would only be a question of a short time when farmers would recognize the advantage of the system.

The utilization of waste products is a subject which should engage the attention of farmers. Many of the by-products of the farm which are now allowed to go to waste could be turned to good account by the use of electrically operated apparatus.

In packing fruit for the market only sound fruit is selected, and that which is bruised or in the first stages of decay is thrown out. Instead of allowing this refuse in the case of apples and grapes to go to waste it may by the use of electrically operated presses or stills be turned into cider or grape juice. The pomace which remains may be used as a fertilizer for the soil.

The potato contains from 15 to 20 per cent. of starch, which in turn may be converted into alcohol. In many instances potatoes are accidentally frozen. Although of no use for food after being frozen, such potatoes contain a considerable percentage of alcohol of high strength and the practice of converting frozen potatoes into alcohol is common in Germany.

The Government in Germany has recently taken an active interest in the utilization of farm byproducts, and in reports on electrically operated farms it appears that a number of plants have been installed for drying the leaves of the potato and the beet to be used as food for cattle. Such leaves are high in fat producing elements. The records show that twenty-four million tons of green leaves are dried annually, producing six million tons of preserved green foodstuff of a value of nearly \$12,000,000.

In 1901, when the potato crop of Germany was 53,682,010 short tons, efforts were made to discover practical and economical methods of preserving potatoes so that the surplus could be utilized in supplying subsequent demand without incurring the losses of storage in silos or bins. Potatoes stored in bins lose 10 per cent. in value, which would mean an annual loss of \$25,000,000. There have been established in Ger-

many some 436 plants for drying potatoes, with an estimated annual production of from 110,230 to 165,345 short tons. The process employed for preserving potatoes consists of washing,

drying, peeling and cutting, after which the final drying takes place. The potatoes are sold as potato flakes at prices varying from 1 1/4 to 1 3/4 cents per pound. A great volume of the German potato crop is converted into a so-called potato flour.

As a result of better lighting greater efficiency and cleanliness are secured on the farm, fire risks are diminished and insurance rates are reduced. Electric lighting is of particular service in stables and barns, where the use of lanterns has caused countless fires and destroyed millions of dollars in property.

Another great advantage in using electric illumination is that the yard and field may be lighted and controlled from the residence. Field lighting is of especial value during harvest seasons, when the harvest is in danger of being ruined by changes in the weather. The harvest field in such cases may be illuminated to advantage by portable lamps and work continued throughout the night.

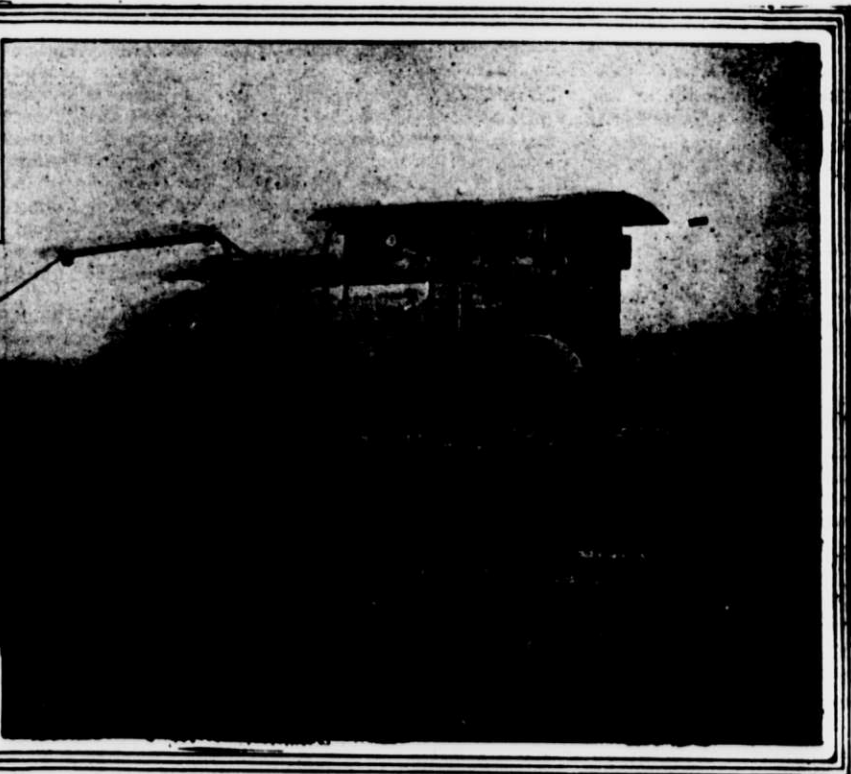
Electricity is a ready servant for cooking and heating. The cost of operating a small electric range is in many cases cheaper than burning coal or wood. When electric current can be bought for five cents a kilowatt hour, as compared with a price of \$1.50 a thousand cubic feet for gas, the cost of electric cooking is the same as when a gas range is employed provided the gas is used with the utmost economy and no heat is wasted.

If the farmer has his own electric generator, current may often be generated for from one to two cents a kilowatt hour. In electric cooking, further, there is no soot or smoke.

In country residences where during certain hours of the day little cooking is carried on, the making of coffee, boiling of eggs and preparing of toast or the supplying of heat to chafing dishes may be accomplished in a few minutes on the table itself.

The heating of flatirons by electricity has proved one of the greatest of the boons conferred by electricity on the household. The electric flatiron is constructed that the current is supplied to the iron either when it is on the stand or during use. Its working temperature is thus readily maintained, overheating is prevented, the accidental scorching of work prevented, and the iron is kept ready for work at a minimum cost.

At the present time, a great part of the labor of mankind is carried on under the supervision of the engineer, whose taking advantage of various natural resources and of inventions and discoveries has built up the giant industries that exist to-day. The seven million farmers throughout the United States should in a similar way take ad-



Electric Operated Plow on a Farm in Germany

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tage of the services of the engineer, who is especially capable in the art of developing and husbanning natural resources through the medium of electric energy.

RACCOONS A CANNING BY-PRODUCT

In Maine growing fat raccoons is a by-product of raising sweet corn for the canning factories. Plump and weighty coons are next to the last crop harvested from the corn patch. The first is the roasting ear in the milk, the second is the glazing kernel for the cannery, the third is the green cornstalks or stover for the silo, the fourth or next to the last consists of a dozen or more coons to every acre of corn and the last benefit comes in winter, when the nutritious ensilage is fed to the hungry coons and converted into milk or cream or high priced dairy butter.

The Maine raccoon is a compact and active bundle of sharp claws and teeth, of loose fur and diabolical cunning. In a fair fight, with no favor shown to either party, a raccoon will whip and send howling home in disgrace any dog of its weight that lives.

The season which the Maine farmers formerly set apart for hunting raccoons was during the full moon of October, partly because the stacked corn in the field held the sweetest and most nourishing rubbin ears at that period, but largely for the reason that all raccoons become more ravenous at the approach of biting cold weather, just before the time comes for them to den up inside of some hollow tree.

For chasing the coons foxhounds are by far the best dogs to employ because their scent is very keen and their staying power is such that they will remain in the open for nights and days in succession, barking and biting at the roots of a tree with a raccoon comfortably stowed away among its topmost branches.

In the old days when hardwood timber was abundant it was the custom to chop down the tree in which the raccoon was lodged and enjoy for a few moments the cruel sport of watching by lantern light while the pack of dogs

tore their fighting and struggling victim to shreds.

The increasing scarcity of hardwood timber combined with the growing values of the coon flesh and fur has caused a change of tactics in conducting coon hunts in Maine. However large the company of hunters may be the number of dogs taken along is limited to two, or three at the most. Instead of felling the tree an active boy is sent aloft with a lantern to spy out the hiding place of the animal. When discovered the coon is often dislodged by shooting rockets into its place of hiding. Often the daring coon leaps twenty or thirty feet to the ground and gets away before the dogs can discover its track. As a rule these dramatic escapes are no more than temporary respites, for the coon invariably "trees" again further in the forest, when the conflict must be renewed.

It is not considered sportsmanlike for a hunter to try and shoot the coon when it is hiding in a tree top, though the difficulty of aiming in the uncertain light no doubt affords the best protection the coons could demand. It is even a worse offence against hunting ethics to climb a tree by lantern light and slay a coon with a close range shot from a revolver.

The most desirable specimens are the large and weighty old raccoon, which are too old to take to the trees, but turn and fight the dogs as they come along in succession. The swiftest dog getting killed or disabled first.

The average Maine raccoon when fat and not aged weighs from twenty to thirty pounds. The coveted fighters which are too old and fat to climb trees weigh at times forty and even fifty-five and sixty pounds. Though the outlay required in dog flesh and human endurance is enormous the hunting party which captures one of these fighters has something to boast about.

May Cutter Operated by Portable Motor

Practice has proved that all farm machinery can advantageously be operated by electric motors. The farm machines usually so operated are ploughs, rollers, reapers, thrashers, corn grinders, corn shellers and shredders, fodder cutters, wood saws, pumps, horse and sheep clippers, unloading and hoisting hay machines, &c. An additional labor saving use of motors is in the operation of washing machinery, carpet sweepers, sewing machines, fans and heating appliances for cooking purposes and heating irons, none of which could be served as well by any other agency. Aside from these purposes electricity supplies the best kind of light for the farm.

A farmer may possess his own electric generating station, which may be operated by water, steam, gas, gasoline, oil or wind power. If a stream runs through the property cheap power may be derived from this natural source—cheap both as to first cost and operating expenses.

If the electric current is generated by steam power the cost per kilowatt hour will be comparatively high, yet by proper engineering one horse-power may be obtained for one cent per hour and less. Practically the same results may be obtained with a gas producer plant, in which case, instead of burning the coal in a steam boiler and using the steam for driving the engine, the coal is slowly burned in a producer, generating gas for operating the gas engine.

Gasoline, oil and alcohol engines work on the same principle as the gas engine, all being of the internal combustion type. Great strides have been made in the last decade in this type of engine, and to-day it operates with reliability and economy and requires but little attention.

Another source of energy for the generation of electric current for farms and country residences is the windmill. The early Dutch windmills were built with sweeps from 50 to 100 feet in diameter, but modern American windmills have sweeps of from 12 to 18 feet and generate more power than the Dutch mills with less attention.

All the prime movers mentioned may be connected to electric generators by belt, gearing or couplings and the con-

necting a belt to a threshing machine, and supplied with current through a flexible cable. The throwing of a switch starts the motor, which requires no further attention. After the threshing is completed, the motor may be connected with the baling machine, which packs the straw into bales, and when this is completed the motor may be used to operate a hoist for loading wagons with the bales. At other times the same motor will serve to drive the water pump, wood saw and other farm machinery.

The electric motor may be operated without the attention necessary to be given to steam or gasoline prime movers which have to be supplied with water, coal or gasoline, as the case may be. The fire risks with motors are far less than with other forms of prime movers and, in fact, an electric motor, when enclosed, may be placed anywhere on the farm without fire risk or fear of explosion.

The motors used for dairy appliances and for the various household operations are of such small size and weight that they are readily carried around by one or two persons and may be applied to one machine or another as needed. Thus many farms can get along with one small and one large motor.

Another use of electricity on the farm which is not yet recognized by farmers is in refrigeration and cold storage. By means of an electrically operated cold storage system butter, milk, eggs and other perishable goods may be kept. In many cases, especially with fruits, the farmer is forced to let his product lie on the ground and rot because the price offered does not repay expense of picking, packing and shipping to the commission merchant. A cold storage system would enable him to pick his fruit in the proper season, when the market price is low, and store it until he realizes a profitable figure.

Ice machines for the refrigerating plant are in such cases preferably electrically operated. The motor used may be so arranged as to start and stop automatically, keeping the temperature in the cold storage room within a few degrees of that desired.

For irrigation purposes electric pumps are of great service, whether the irrigation is on a large or on a small scale.